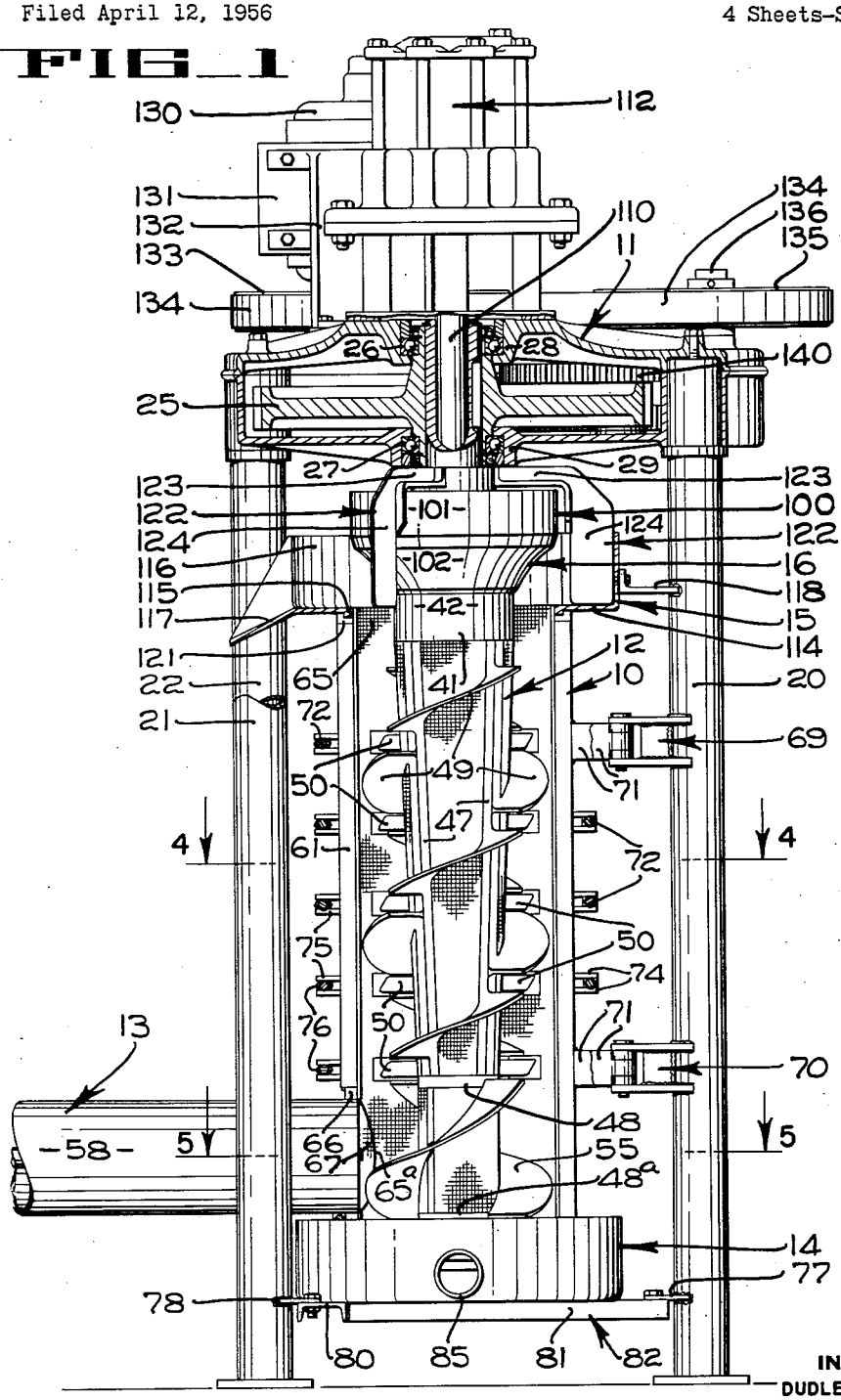
May 22, 1962 D. W. HAYES 3,035,511

VERTICAL SCREW PRESS

Filed April 12, 1956 4 Sheets-Sheet 1

FIG_1



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VERTICAL SCREW PRESS

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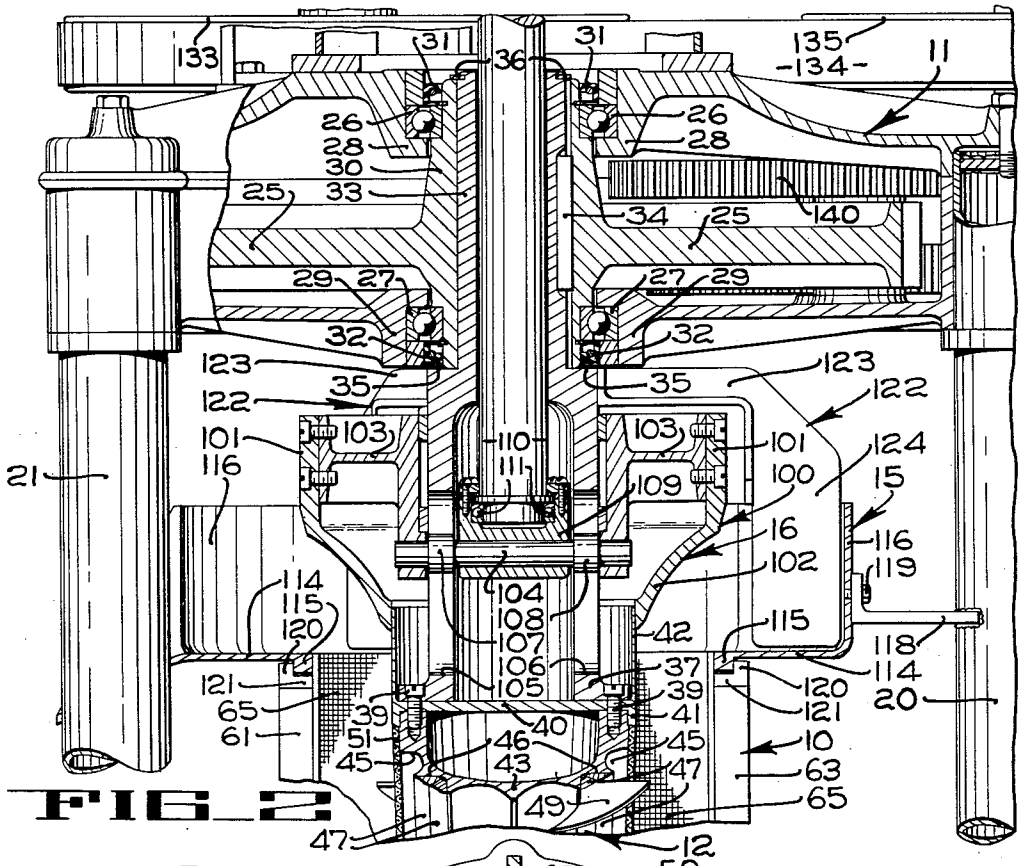


FIG_2

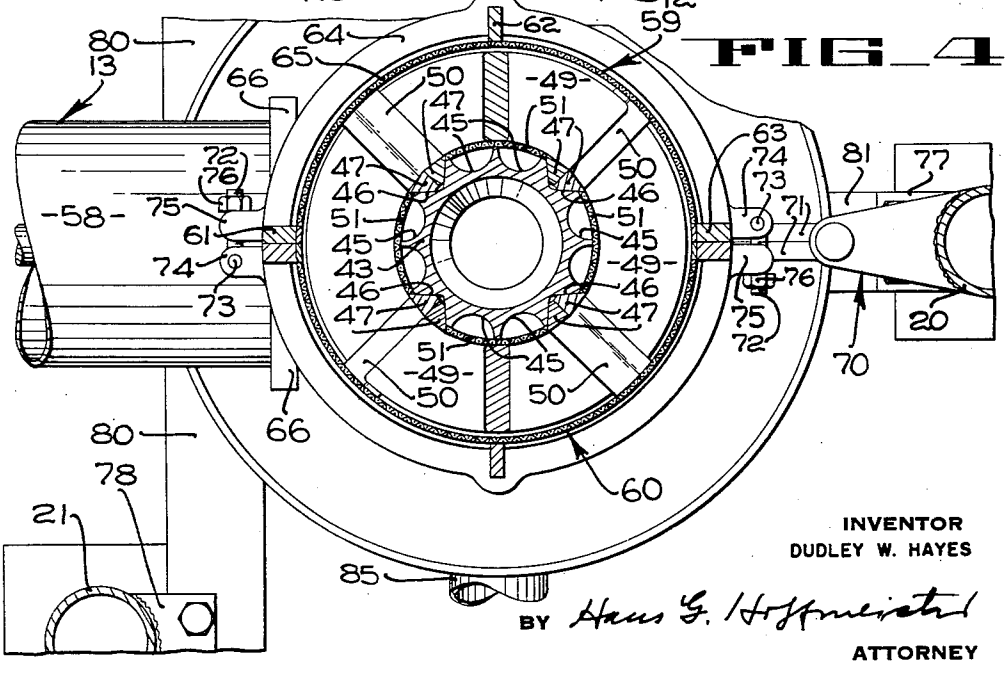


FIG_4

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May 22, 1962 D. W. HAYES 3,035,511

VERTICAL SCREW PRESS

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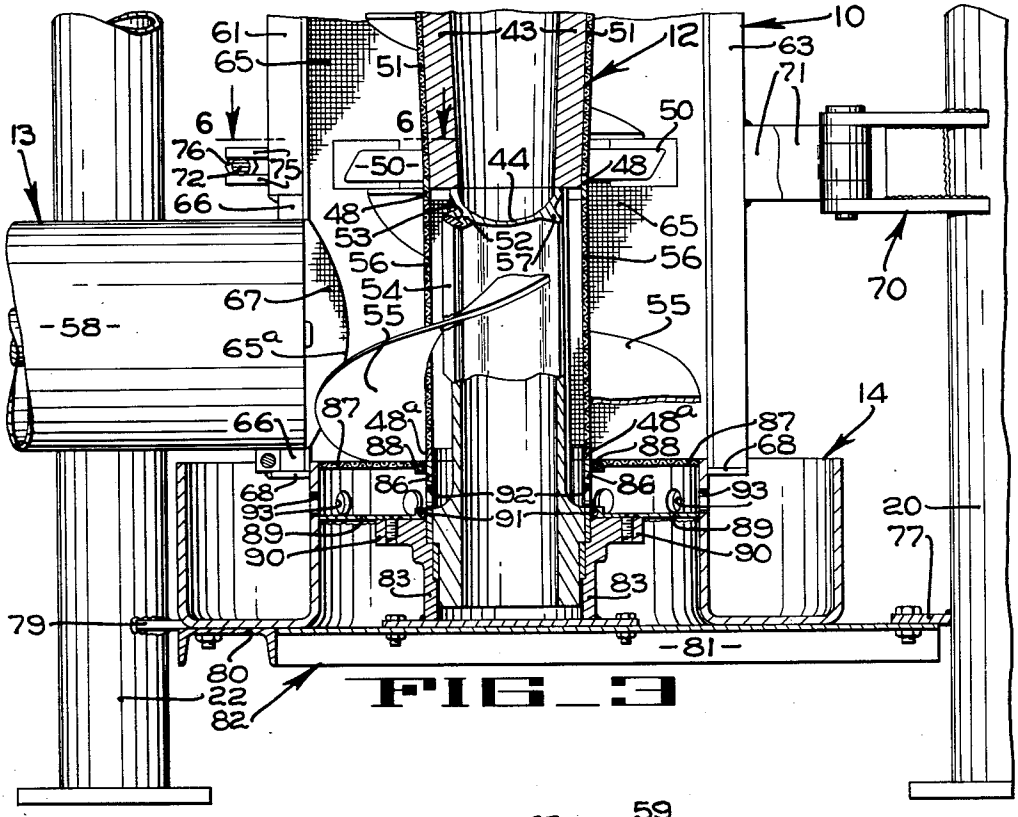


FIG_3

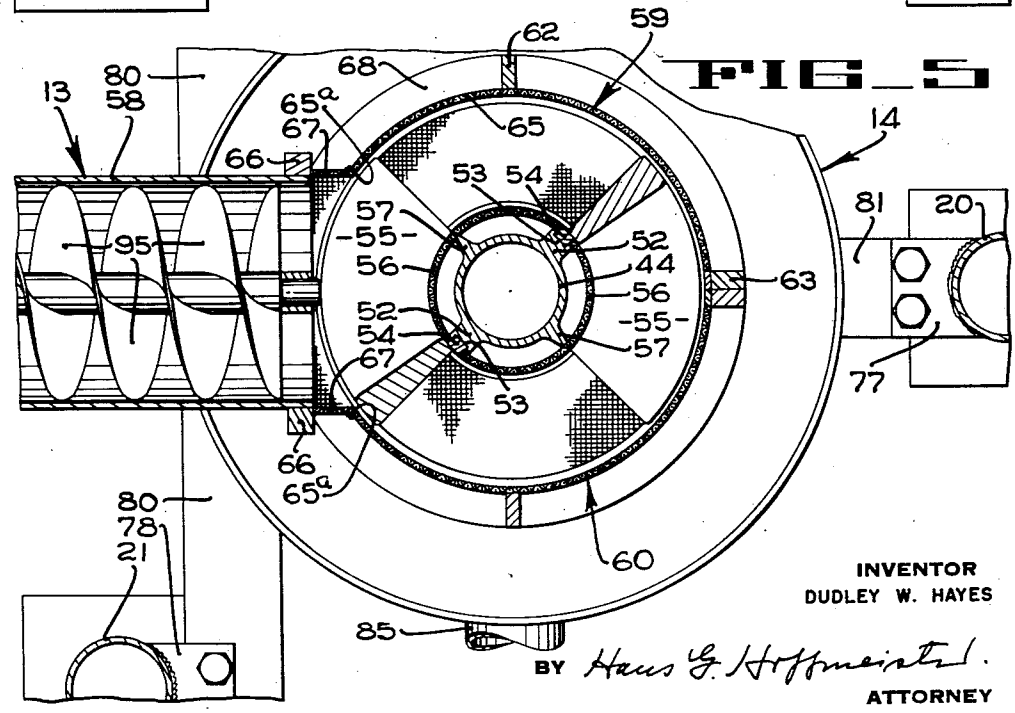


FIG_5

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VERTICAL SCREW PRESS

Filed April 12, 1956 4 Sheets-Sheet 4

FIG_9

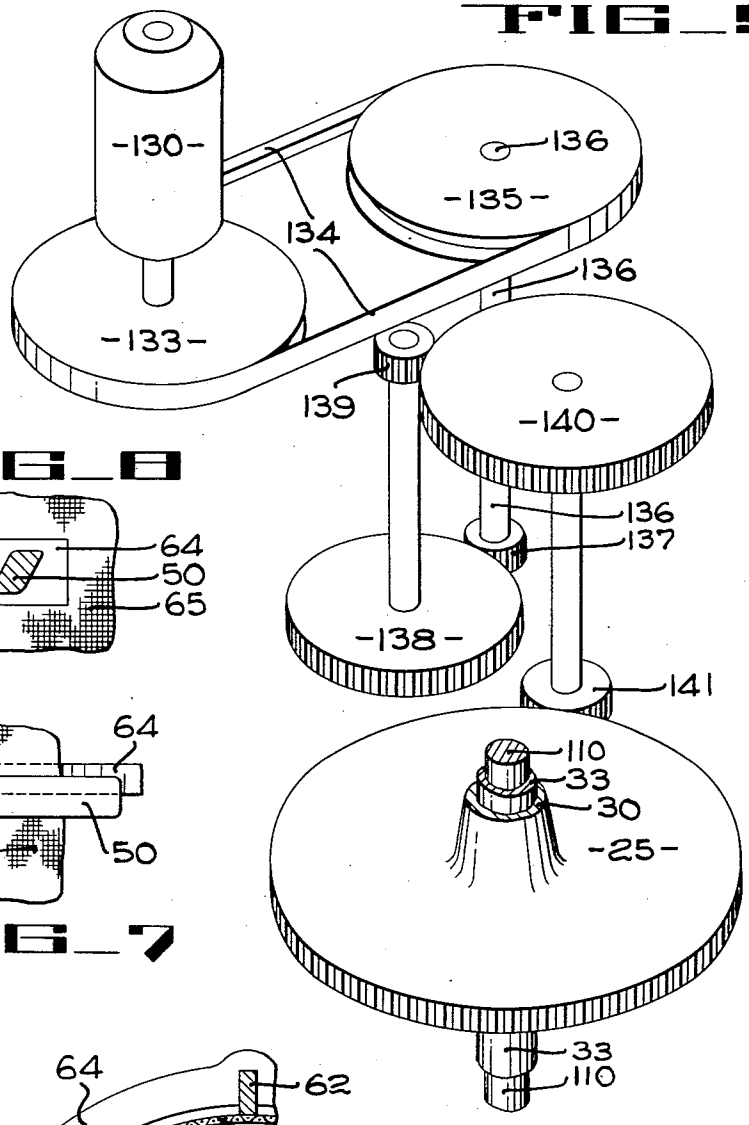


FIG_8

FIG_7

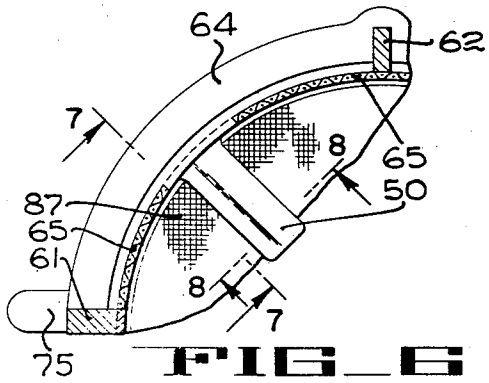


FIG_6

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United States Patent Office 3,035,511 Patented May 22, 1962

3,035,511

VERTICAL SCREW PRESS

Dudley W. Hayes, San Jose, Calif., assignor to FMC Corporation, a corporation of Delaware

Filed Apr. 12, 1956, Ser. No. 577,696
15 Claims. (Cl. 100—117)

This invention pertains to improvements in presses and more specifically relates to an improved continuous press of the screw type for the expressing of liquids from solids.

The improved press of the instant invention finds particular utility in paper and pulp mills for removing liquids from pulp, and in food processing plants for removing the juices from various fruits or vegetables, or from the waste products resulting from other processing of said fruits or vegetables.

One object of the invention is to provide a press wherein the effluent flows in a direction counter to the direction of the flow of the material being pressed.

Another object of the invention is to provide a press having a more efficient and flexible control of the pressure exerted within the press than heretofore obtainable in presses of similar type.

Still another object of the invention is to provide a continuous press which is self-priming.

Other objects and advantages of the invention will become apparent from the following description and the accompanying drawings, wherein:

FIG. 1 is an elevation view of a press embodying the principles of the present invention, with one-half of the outer screen removed and certain of the parts shown in section.

FIG. 2 is an enlarged vertical section of the upper portion of the machine shown in FIG. 1, the section being taken substantially on a diametrical plane with certain parts shown in elevation.

FIG. 3 is an enlarged vertical section of the lower portion of the machine shown in FIG. 1.

FIG. 4 is a horizontal section taken along line 4—4 of FIG. 1.

FIG. 5 is a horizontal section of FIG. 1 taken along line 5—5 thereof.

FIG. 6 is a horizontal section taken along line 6—6 of FIG. 3.

FIG. 7 is a vertical section taken along line 7—7 of FIG. 6.

FIG. 8 is a section of a portion of FIG. 6 taken along line 8—8 thereof.

FIG. 9 is a schematic perspective showing the power train of the drive mechanism of the press.

In general the press illustrated in FIG. 1 comprises an outer screen **10** and a cone-shaped screw assembly **12** mounted coaxially therewithin. The material to be pressed is introduced to the press adjacent the bottom thereof by a conveyor **13**. The material is moved upwardly through the press, between the outer annular screen **10** and the cone-shaped screw assembly **12**, by rotation of the screw assembly. The liquid expressed through the screen **10** flows downwardly along the outer side thereof and is collected in an annular trough **14** surrounding the lower end of the screen. The solid material is expelled from the upper end of the screen **10** into an annular pan **15**. The working pressure within the press is controlled by a choke assembly **16** which cooperates with the upper end of the screen **10** to restrict the flow of the solid material therefrom.

Referring now to FIGS. 1 and 2 of the drawings, a drive housing **11** is supported on the upper ends of three vertical standards **20**, **21** and **22** which rest on the floor or any suitable base. A main gear **25**, having a hub **30** formed integral therewith, is rotatably mounted within the

drive housing **11** by a pair of thrust bearings **26** and **27** (FIG. 2) mounted in suitable bosses **28** and **29** formed in the housing. Suitable packing elements **31** and **32**, respectively, are interposed between each of the bosses **28** and **29** and the hub **30** externally of the bearings **26** and **27** to prevent leakage of oil from the housing **11**. A sleeve **33** is mounted within the hub **30** and keyed thereto by a key **34**. The sleeve **33** extends downwardly from the housing **11** and is provided with an upwardly facing shoulder **35** abutting the lower end of the hub **30**. A snap ring **36** is received in a suitable groove adjacent the upper end of the sleeve **33** and abuts the upper end of the hub **30** to lock the gear against axial movement on the sleeve. The lower end of the sleeve **33** is provided with an outwardly extending annular flange **37**.

The cone-shaped screw assembly **12**, previously mentioned, is fastened to the flange **37** of the sleeve **33** for rotation therewith by a plurality of cap screws **39** in the manner shown in FIG. 2. A disc **40** is interposed between the lower end of the sleeve **33** and the upper end of the screw assembly **12**. The disc **40** is provided with a downwardly extending flange **41** and an upwardly extending flange **42** at its peripheral edge. The purpose of these flanges will be explained hereinbelow.

The screw assembly **12** comprises an upper frusto-conical member **43** (FIG. 3) and a lower cylindrical member **44** fastened together, as by welding, in end-to-end relation in the manner shown in FIG. 3. As best seen in FIGS. 2 and 4, the outer surface of the upper member **43** of the screw assembly **12** is provided with a plurality of longitudinally extending grooves **45**, and with V-shaped grooves **46** at four points equally spaced about the member **43** between the grooves **45**. Two triangular-shaped flight-supporting rods **47** are received in each of the V-shaped grooves **46**. The upper ends of the rods are disposed behind the flange **41** on the disc **40** (previously described), and the lower ends are locked in the V-grooves **46** by means of a clamp ring **48** shown in FIGS. 1 and 3. A plurality of helical flight members **49** are fixed to the bars **47** at spaced points therealong. Each of the flight members **49** extends approximately one quarter of the way around the periphery of the member **43**, and each of the ends thereof is fixed to one of the rods **47** as seen in FIG. 1. The flights in one section tend to continue from the flights in the section next adjacent thereto to form a double helix extending the length of the member **43**. However, the lowermost edge of the flights of one section are stepped vertically upward from the upper edge of the flights of the section next adjacent thereto to provide clearance for a plurality of breaker bars **50**, more fully described hereinbelow. A section of screen material **51** (FIG. 4) is interposed between the inner edge of the flights **49** and the exterior surface of the member **43** and is held in this position by the flights **49**. The outer edges of all of the flights **49** are equidistant from the axis of rotation of the screw assembly **12**.

The lower cylindrical member **44** (FIGS. 3 and 5) of the screw assembly **12** is provided with two outwardly extending longitudinal flanges **52** each having a longitudinally extending groove **53** formed in its outer surface. A rod **54** is received in each of the grooves **53** and the upper end of the rod is held in the groove by the clamp ring **48**, previously described, and the lower end by a clamp ring **48***a*. Two flights **55** are mounted one on each of the rods **54**, and two semicylindrical screen sections **56** are interposed between the inner edges of the flights **55** and the member **44**. Two outwardly extending longtiudinal ribs **57** are provided on the member **44** midway between the flanges **52** to support the mid-portions of the screen section **56**.

The previously mentioned cylindrical outer screen as-

sembly 10 surrounds the screw assembly 12 in coaxial relation therewith and the inner surface of the screen assembly 10 is substantially in sliding engagement with the outer edges of the flights 49 and 55. The outer screen assembly 10 comprises two complementary semicylindrical sections 59 and 60 (FIG. 4). The sections 59 and 60 are mirror images of each other and, therefore, only the section 59 will be described in detail.

As seen in FIGS. 4, 5 and 6, the outer screen assembly section 59 comprises a rigid frame having three vertically extending bars 61, 62 and 63. The bars 61, 62 and 63 are held in their proper spaced positions, with the rods 61 and 63 defining each of the edges of the section 59 and the rod 62 being disposed adjacent the mid-portion thereof, by a plurality of horizontally disposed semicircular ribs or braces 64 which are welded to each of the bars 61, 62 and 63. The breaker bars 50, previously mentioned, are either cast integral with the ribs 64, as shown in FIG. 7, or suitably attached thereto and extend inwardly therefrom at the points on each of said ribs midway between the bars 61 and 62 and midway between the bars 62 and 63. When the screen assembly 10 is installed, the bars 50 extend between the ends of the individual flights 49. A semicylindrical section of screen material 65 is fastened in any suitable manner to the inner surface of the frame comprising the rods 61, 62 and 63 and the circular ribs 64. The screen material 65 is provided with suitable openings, in the manner shown in FIG. 8, to permit the breaker bars 50 to protrude therethrough. It should, of course, be realized that the particular mesh size of the screen material 65 should be chosen according to the material to be processed in the press. It is contemplated that the screen may have openings as small as .025" when handling finely divided material.

As best seen in FIGS. 3 and 5, the vertical bar 61 terminates short of the lower end of the screen section 59, and a semicircular member 66 connects the lower end of the member 61 with a flange 68 at the lower endge of the screen section 59. A semicircular opening 65*a* is cut in the screen 65 and a semicircular screen 67 connects between the edges of the opening 65*a* in the screen 65 and the member 66. The member 66, together with its complemental member on the screen section 60, defines a circular inlet opening having its axis at right angles to the axis of the main screen assembly 10. The material to be pressed is fed into said opening by the previously mentioned screw feed conveyor 13. As best seen in FIG. 5, the feed conveyor 13 comprises a cylindrical housing 58, suitably attached to the members 66 on the screen sections 59 and 60, and a helical screw 95 mounted within the housing 58 and driven by any suitable means (not shown).

As best seen in FIG. 1, the two sections 59 and 60 of the screen assembly 10 are mounted on a pair of brackets 69 and 70 fixed to the vertical standard 20 at spaced points therealong and extending inwardly therefrom toward the axis of the screw assembly 12. Each of the screen sections 59 and 60 are pivotally supported by the brackets 69 and 70 by offset arms 71 so that each section may independently be swung from its closed position surrounding the screw assembly 12, to an open position exposing the screw assembly for cleaning or repair. When in closed relation, the screen sections 59 and 60 are latched together by a plurality of swing bolts 72 pivotally mounted on pins 73 extending between spaced laterally extending flanges 74 on one of the vertical bars 61 or 63 of the sections 59 or 60, and extending between spaced laterally extending flanges 75 on the opposing bars 61 or 63 of the other of the sections 59 or 60. The swing bolts 72 are held in their latching position by nuts 76 threaded thereon and abutting the lateral edges of the flanges 75.

As best seen in FIGS. 1, 3 and 5, the liquid expressed through the screen 10, flows downwardly along the outer side of the screen and is collected in the previously mentioned annular U-shaped trough 14 which, in turn, is provided with a discharge spout 85. The U-shaped trough 14 is mounted on a subframe generally indicated at 82 with its inner wall within the lower end of the circular screen assembly 10 and its outer wall spaced outwardly from the outer surface thereof.

As best seen in FIG. 5, the subframe 82 comprises a bracket 77 fixed to the vertical standard 20, a bracket 78 fixed to the vertical standard 21 and a bracket 79 (FIG. 3) fixed to the standard 22. A channel member 80 is fixed at its opposite ends to the brackets 78 and 79 and a second channel member 81 is welded at one of its ends to the central portion of the channel member 80 and is fixed at its other end to the bracket 77.

Referring now particularly to FIG. 3, a sleeve 83 is fixed to the subframe 82 and extends upwardly therefrom in embracing relation with the lower end of the screw assembly 12 to form a guide therefor. A sleeve 86 is rotatably received within the sleeve 83 and is fixed to the lower end of the screw 12 in abutting relation with the lower end of the clamp ring 48*a* mounted thereon, and encloses the lower end portions of the grooves between the flanges 52 and the ribs 57, previously described. A flat annular screen member 87 closes the annular space between the upper ring of the inner wall of the annular trough 14, and the sleeve 86. An O-ring 88 is mounted adjacent the inner edge of the screen 87 in sealing engagement with the outer surface of the sleeve 86. A flat annular plate 89 is fixed to a flange 90 on the sleeve 83 and is welded to the inner side of the inner wall of the trough 14 as a point spaced downwardly from the screen 87. A suitable O-ring 91 is mounted adjacent the inner edge of the plate 89 in sealing engagement with the sleeve 86. A plurality of ports 92 in the sleeve 86 connect the spaces between the flanges 52 and the ribs 57 of the lower section 44 of the screw assembly 12 with the space between the screen 87 and the plate 89. Similarly, a plurality of ports 93, in the inner wall of the trough 14, connect the space between the screen 87 and the plate 89 with the interior of the trough 14. Thus, it can be seen that the effluent forced inwardly through the screens 51 and 56 on the screw assembly 12 will flow downwardly through the grooves 45 and the space between the flanges 52 and the ribs 57 and outwardly through the ports 92 and 93 into the collecting trough 14.

Referring now to FIGS. 1 and 2, the choke assembly 16, which, as previously mentioned, controls the discharge of the relatively dry material from the upper end of the annular space between the screw assembly 12 and the screen assembly 10, comprises a choke member 100 having an upper cylindrical section 101 and a lower downwardly and inwardly tapered conical section 102. The conical portion 102 of the member 100 is adapted to be received within the upper end of the screen assembly 10 and the inner surface of the lower portion of the conical section 102 is in sliding contact with the outer surface of the upwardly extending annular flange 42 on the member 40 previously described in connection with the screw assembly 12. The choke member 100 is supported by a spider assembly 103 fixed to the inner surface of the cylindrical portion 101 and slidably mounted on the exterior of the lower portion of the sleeve 33, previously described. A pin 104 is fixed to the hub of the spider 103 and extends diametrically thereof through two opposed longitudinally extending slots 105 and 106 formed in the sleeve 33. Two rollers 107 and 108 are mounted on the pin 104 one within each of the slots 105 and 106, respectively. From this structure it is evident that the choke member 100 rotates with the sleeve 33 and the screw assembly 12 attached thereto, but is capable of longitudinal movement with respect thereto to regulate the size of the discharge opening at the upper end of the screen assembly 10.

In order to provide the longitudinal movement of the

choke member **100** to regulate the size of the discharge opening, a swivel head **109** is fixed to the central portion of the pin **104**. The swivel head **109** is rotatably connected to the lower end of a shaft **110** by a suitable bearing **111**. The shaft **110** extends upwardly through the sleeve **33** and is connected to the piston of a suitable hydraulic or pneumatic cylinder **112** rigidly mounted above the drive housing **11** in concentric relation with the sleeve **33** in the manner shown in FIG. 1. It is evident that when the cylinder **112** is actuated, the shaft **110** will be moved upwardly or downwardly relative to the sleeve **33** and the screw assembly **12** and thus will cause the choke member **100** to be moved outwardly or inwardly relative to the upper end of the screen assembly **10** to regulate the discharge of the solid material therefrom. It is further evident that the movement of the choke member **100** may be readily accomplished both when the press is operating and when it is not.

The relatively dry solids issuing from the upper end of the screen assembly **10** are guided laterally by the conical surface **102** of the choke member **100** into the previously mentioned annular pan **15** mounted adjacent the upper end of the screen assembly **10**. The pan **15** has a bottom portion **114**, the inner edge of which is provided with a depending annular flange **115** and an outer vertical side portion **116**. A discharge chute **117** is formed integral with the pan **15**. The pan **15** is supported by a plurality of similar brackets fixed to the vertical column **20**, **21** and **23**, respectively. Only one of the brackets is shown at **118** in FIGS. 1 and 2 of the drawings. The bracket **118** is bolted to the vertical wall **116** of the pan **15** by suitable bolts **119** threaded into suitable holes in the wall **116**. It can be seen that by proper selection of the points at which the threaded holes in the wall **116** are located, the discharge chute **117** may be selectively located in any orientation relative to the remainder of the machine. The depending annular flange **115** on the inner edge of the bottom **114** of the pan **15** is embraced by an upwardly extending annular rim **120** formed integral with a semicircular member **121** at the upper end of each of the sections **59** and **60** of the screen assembly **12**.

As best seen in FIG. 2, a plurality of paddle members **122** are fixed to the sleeve **33** between the upper end of the choke member **100** and the lower portion of the drive housing **11**. Each of the paddle members **122** has a horizontally extending arm **123** which extends outwardly beyond the choke member **100**, and a downwardly depending paddle **124**, connected to the outer end thereof. The paddle **124** substantially conforms to the cross sectional configuration of the interior of the pan **15**, whereby, as the solid material is expelled from the upper end of the screen **10** into the pan **15** by the cone surface **102** of the choke member **100**, the paddles move the material thus expelled around the pan **15** and into the discharge chute **117**.

The drive mechanism for rotating the screw assembly **12** is best illustrated in FIG. 9 and comprises a motor **130** mounted on a base plate **131** adjustably connected to a vertical bracket **132** fixed to the upper surface of the drive housing **11** in the manner shown in FIG. 1. Referring again now to FIG. 9, the motor **130** has fixed thereto a pulley **133** connected by a belt drive **134** to a pulley **135** fixed to a vertically disposed shaft **136** rotatably mounted in the drive housing **11** and extending upwardly therefrom. Within the drive housing **11**, a spur gear **137** on the shaft **136** drives the main gear **25**, previously mentioned, through a reduction gear chain comprising gears **138**, **139**, **140** and **141**.

In operation of the press, the motor **130** is started to commence the rotation of the screw assembly **12**, and the feed conveyor **13** is started to feed the material to be pressed into the annular space between the screw assembly **12** and the outer screen assembly **10**. The flights **55** and **49** urge the material upwardly between the screw and the screen. Due to the conical shape of the upper section **43** of the screw assembly **12**, the cross sectional area of the annular space between the screw assembly **12** and the screen **10** is progressively reduced and therefore the material is compressed. The liquid content of the material is expressed outwardly through the screen **10** and flows down the outer surface thereof and is collected in the trough **14**. Some of the fluid is expressed inwardly through the screens **51** and **56** on the screw assembly **12** and flows downwardly through the grooves **45** and ultimately into the trough **14** in the manner heretofore described.

The relatively dry solid material is expelled from the top of the screen **10** and forced outwardly into the pan **15** by the cone surface **102** of the choke member **100**. The amount of pressure applied to the material is readily controlled by moving the choke member **100** toward and away from the upper end of the screen assembly **10** by proper manipulation of the hydraulic or pneumatic cylinder **112**. As can be plainly seen, the choke may readily be moved to change the pressure applied to the material while the press is operating.

Since the material travels vertically upwardly through the machine, the liquid flowing downwardly over the outer surface of the screen **10** is moving away from the previously pressed material and does not tend to rewet the material as in prior vertical presses wherein both the dry solids and the liquid are discharged from the bottom of the press.

Further, since the material travels upwardly against the pull of gravity, it is not usually necessary to prime the press by completely closing the choke **16** to initially build up a plug of dry solids when starting the press.

While I have shown and described the preferred embodiment of my invention, it is obvious that various changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In an expressing press, an outer cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a downwardly and inwardly tapered cone rotatably supported from said drive housing and extending downwardly therefrom coaxially within said cylindrical screen, a plurality of longitudinally extending grooves formed in the outer surface of said cone, a plurality of flight sections fixed to said cone, and screen sections between the inner edges of said flight sections and said cone and covering said grooves.

2. In an expressing press, an outer cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a downwardly and inwardly tapered cone rotatably supported from said drive housing and extending downwardly therefrom coaxially within said cylindrical screen, a plurality of longitudinally extending grooves formed in the outer surface of said cone, a plurality of longitudinally extending bars removably secured in certain of said grooves, a plurality of flight sections fixed to said bars, and screen sections between the inner edges of said flight sections and said cone and covering the remainder of said grooves.

3. In an expressing press, an outer cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a downwardly and inwardly tapered cone rotatably supported from said drive housing and extending downwardly therefrom coaxially within said cylindrical screen, a plurality of longitudinally extending grooves formed in the outer surface of said cone, a plurality of longitudinally extending bars removably secured in certain of said grooves, a plurality of flight sections fixed to said bars, screen sections between the inner edges of said flight sections and said cone and covering the remainder of said grooves, an annular trough surrounding the lower end of said outer screen for collecting the liquid expressed therethrough and flowing down the outer side thereof, and means con-

necting the lower ends of the grooves in said cone with said trough for collecting the liquid expressed inwardly through the screen sections on said cone.

4. In an expressing press, an outer cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a downwardly and inwardly tapered cone rotatably supported from said drive housing and extending downwardly therefrom coaxially within said cylindrical screen, a plurality of longitudinally extending grooves formed in the outer surface of said cone, a plurality of longitudinally extending bars removably secured in certain of said grooves, a plurality of flight sections fixed to said bars, screen sections between the inner edges of said flight sections and said cone and covering the remainder of said grooves, an annular trough surrounding the lower end of said outer screen for collecting the liquid expressed therethrough and flowing down the outer side thereof, means connecting the lower ends of the grooves in said cone with said trough for collecting the liquid expressed inwardly through the screen sections on said cone, a downwardly and inwardly inclined cone-shaped choke, the lower end of said choke being in sliding engagement with the upper portion of said cone adjacent the upper end of said outer screen, and means for moving said choke longitudinally of said cone to adjust the pressure within the press.

5. In an expressing press, an outer cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a downwardly and inwardly tapered cone rotatably supported from said drive housing and extending downwardly therefrom coaxially within said cylindrical screen, a plurality of longitudinally extending grooves formed in the outer surface of said cone, a plurality of longitudinally extending bars removably secured in certain of said grooves, a plurality of flight sections fixed to said bars, screen sections between the inner edges of said flight sections and said cone and covering the remainder of said grooves, an annular trough surrounding the lower end of said outer screen for collecting the liquid expressed therethrough and flowing down the outer side thereof, means connecting the lower ends of the grooves in said cone with said trough for collecting the liquid expressed inwardly through the screen sections on said cone, a downwardly and inwardly inclined cone-shaped choke, the lower end of said choke being in sliding engagement with the upper portion of said cone adjacent the upper end of said outer screen, means for moving said choke longitudinally relative to said cone, and means for feeding material to be pressed to the annular space between said cone and said outer screen adjacent the lower end thereof.

6. In an expressing press, a cylindrical screen, a drive housing mounted adjacent one end of said screen, a sleeve mounted for rotation in said drive housing and extending therefrom coaxial with and toward said screen, a tapered screw mounted on the end of said sleeve and extending therefrom coaxially within said cylindrical screen, a cone-shaped choke slidably mounted on said screw with its smaller end disposed toward and adjacent the said one end of said screen, a fluid actuated cylinder mounted on the side of said drive housing away from said screen in coaxial relation with said sleeve, a piston in said cylinder, a piston rod connected to said piston and extending within said sleeve, a diametrically disposed rod swivelly connected at its central portion to the end of said piston rod, and a pair of longitudinally extending diametrically opposed slots in said sleeve, said diametrically disposed rod extending through said slots and being connected at its outermost ends to said choke.

7. In an expressing press, a cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a sleeve mounted for rotation in said drive housing and extending downwardly therefrom, a downwardly and inwardly tapered screw mounted on the lower end of said sleeve and extending downwardly therefrom coaxially within said cylindrical screen, a shaft extending downwardly within said sleeve, a diametrically disposed rod swivelly connected to the lower end of said shaft, a pair of longitudinally extending diametrically opposed slots in said sleeve, said diametrically disposed rod extending through said slots, a downwardly and inwardly inclined cone-shaped choke fixed to the outer ends of said diametrically disposed rod, the lower end of said choke being in sliding engagement with the upper portion of said screw member adjacent the upper end of said screen, and means for moving said shaft longitudinally to move said choke relative to the upper end of said screen.

8. In an expressing press, a cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a sleeve mounted for rotation in said drive housing and extending downwardly therefrom, a downwardly and inwardly tapered screw mounted on the lower end of said sleeve and extending downwardly therefrom coaxially within said cylindrical screen, a fluid actuated cylinder mounted above said drive housing in coaxial relation with said sleeve, a piston in said cylinder, a piston rod connected to said piston and extending downwardly within said sleeve, a diametrically disposed rod swivelly connected to the lower end of said piston rod, a pair of longitudinally extending diametrically opposed slots in said sleeve, said diametrically disposed rod extending through said slots, a downwardly and inwardly inclined cone-shaped choke fixed to the outer ends of said diametrically disposed rod, the lower end of said choke being in sliding engagement with the upper portion of said screw member adjacent the upper end of said screen.

9. In an expressing press, a cylindrical screen mounted with its axis vertical, a drive housing mounted above the upper end of said screen, a sleeve mounted for rotation in said drive housing and extending downwardly therefrom, a downwardly and inwardly tapered screw mounted on the lower end of said sleeve and extending downwardly therefrom coaxially within said cylindrical screen, a fluid actuated cylinder mounted above said drive housing in coaxial relation with said sleeve, a piston in said cylinder, a piston rod connected to said piston and extending downwardly within said sleeve, a diametrically disposed rod swivelly connected to the lower end of said piston rod, a pair of longitudinally extending diametrically opposed slots in said sleeve, said diametrically disposed rod extending through said slots, a pair of rollers rotatably mounted on said rod, one of said rollers being located in each of said slots, a downwardly and inwardly inclined cone-shaped choke fixed to the outer ends of said diametrically disposed rod, the lower end of said choke being in sliding engagement with the upper portion of said screw member adjacent the upper end of said screen.

10. For use in an expressing press, a screw assembly comprising, a truncated cone-shaped member, a cylindrical member connected to the smaller end of said cone member in coaxial relation therewith, a plurality of longitudinally extending grooves in the outer surface of each of said members, the grooves on one of said members being in end-to-end communication with the grooves on the other of said members, a plurality of flight sections fixed to each of said members, and screen sections between said flight sections and each of said members, said screen sections covering said grooves.

11. For use in an expressing press, a screw assembly comprising, a truncated cone-shaped member, a cylindrical member connected to the smaller end of said cone member in coaxial relation therewith, a plurality of longitudinally extending grooves in the outer surface of each of said members, a plurality of longitudinally extending bars removably secured in certain of the grooves on each of said members, a plurality of flight sections fixed to said bars, and screen sections between said flight sections and each of said members, said screen sections covering the remainder of said grooves.

12. In an expressing press, an outer cylindrical screen, a drive housing mounted above the upper end of said screen, a downwardly and inwardly tapered cone rotatably supported from said drive housing and extending downwardly therefrom coaxially within said cylindrical screen, a plurality of longitudinally extending bars removably secured to said cone, a plurality of material lifting flight sections fixed to said bars, and drive means disposed in said housing and connected to said cone to rotate said cone in a direction causing said flights to lift material upwardly within said outer screen.

13. For use in an expressing press, a screw assembly comprising, a truncated cone-shaped member, a cylindrical member connected to the smaller end of said cone member in coaxial relation therewith, means defining a plurality of flow passages extending longitudinally along the surfaces of said cone member and said cylindrical member, a plurality of longitudinally extending bars removably secured to said cone member, a plurality of flight sections fixed to said bars, and screen sections between said flight sections and each of said members and covering said flow passages.

14. In an expressing press, a support structure, a cylindrical screen on said structure, a drive housing mounted adjacent one end of said screen, a drive sleeve mounted for rotation in said drive housing and extending therefrom coaxial with and toward said screen, a tapered screw disposed adjacent the end of said sleeve and extending therefrom coaxially within said cylindrical screen, means securing the larger end of said screw to said sleeve for rotation therewith, a cone-shaped choke slidably mounted on said sleeve with its smaller end disposed toward and adjacent said one end of said screen, a fluid actuated cylinder mounted in fixed position on said support structure on the side of said drive housing away from said screen in coaxial relation with said sleeve, a piston in said cylinder, a piston rod disposed coaxially within said sleeve and extending from said fixed cylinder toward said screen, said piston rod having one end connected to said piston, and means operatively associated with the other end of said piston rod extending radially outwardly therefrom for connecting said piston rod to said choke, whereby admission of fluid into said fixed cylinder effects sliding movement of said choke on said drive sleeve as said piston rod moves within said sleeve.

15. In an expressing press, a support structure, an outer cylindrical screen mounted on said structure with its axis vertical, a drive housing mounted above the upper end of said screen, a sleeve mounted for rotation in said drive housing and extending downwardly therefrom, a downwardly and inwardly tapered screw mounted on the lower end of said sleeve and extending downwardly therefrom coaxially within said cylindrical screen for feeding material upwardly through the press, said screw cooperating with said screen to define an annular processing chamber extending from a lower inlet zone to a relatively small upper discharge zone, means for introducing material to said lower inlet zone between said screw and said screen adjacent the lower ends thereof whereby said screw moves the material upwardly through said chamber and discharges the solids from said discharge zone at the upper end of said screen, a choke adjustably mounted on said sleeve adjacent said upper discharge zone of said processing chamber, and means for adjustably moving said choke.

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